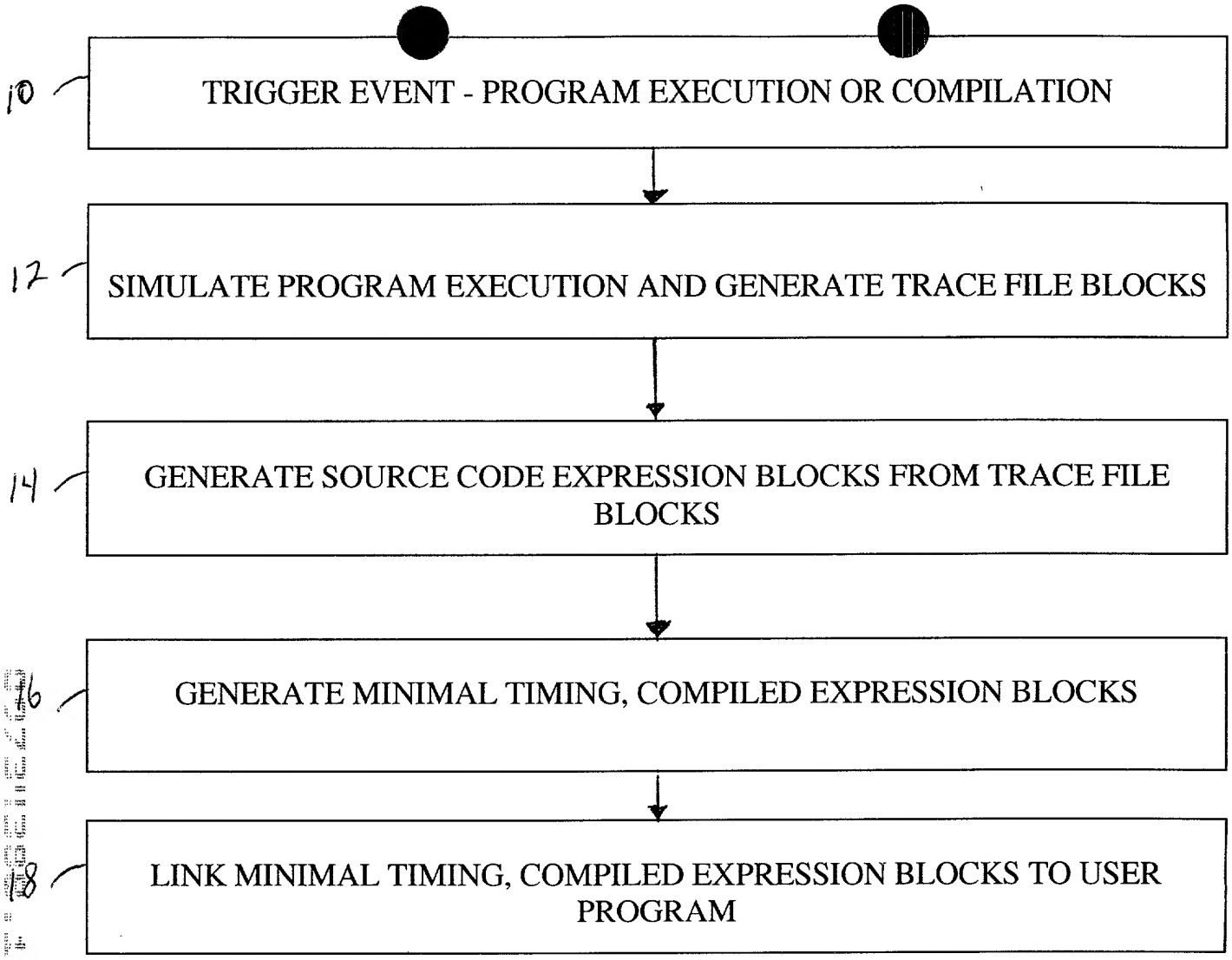
10
TRIGGER EVENT - PROGRAM EXECUTION OR COMPILATION
12
SIMULATE PROGRAM EXECUTION AND GENERATE TRACE FILE BLOCKS
14
GENERATE SOURCE CODE EXPRESSION BLOCKS FROM TRACE FILE BLOCKS
16
GENERATE MINIMAL TIMING, COMPILED EXPRESSION BLOCKS
18
LINK MINIMAL TIMING, COMPILED EXPRESSION BLOCKS TO USER PROGRAM

FIGURE 1

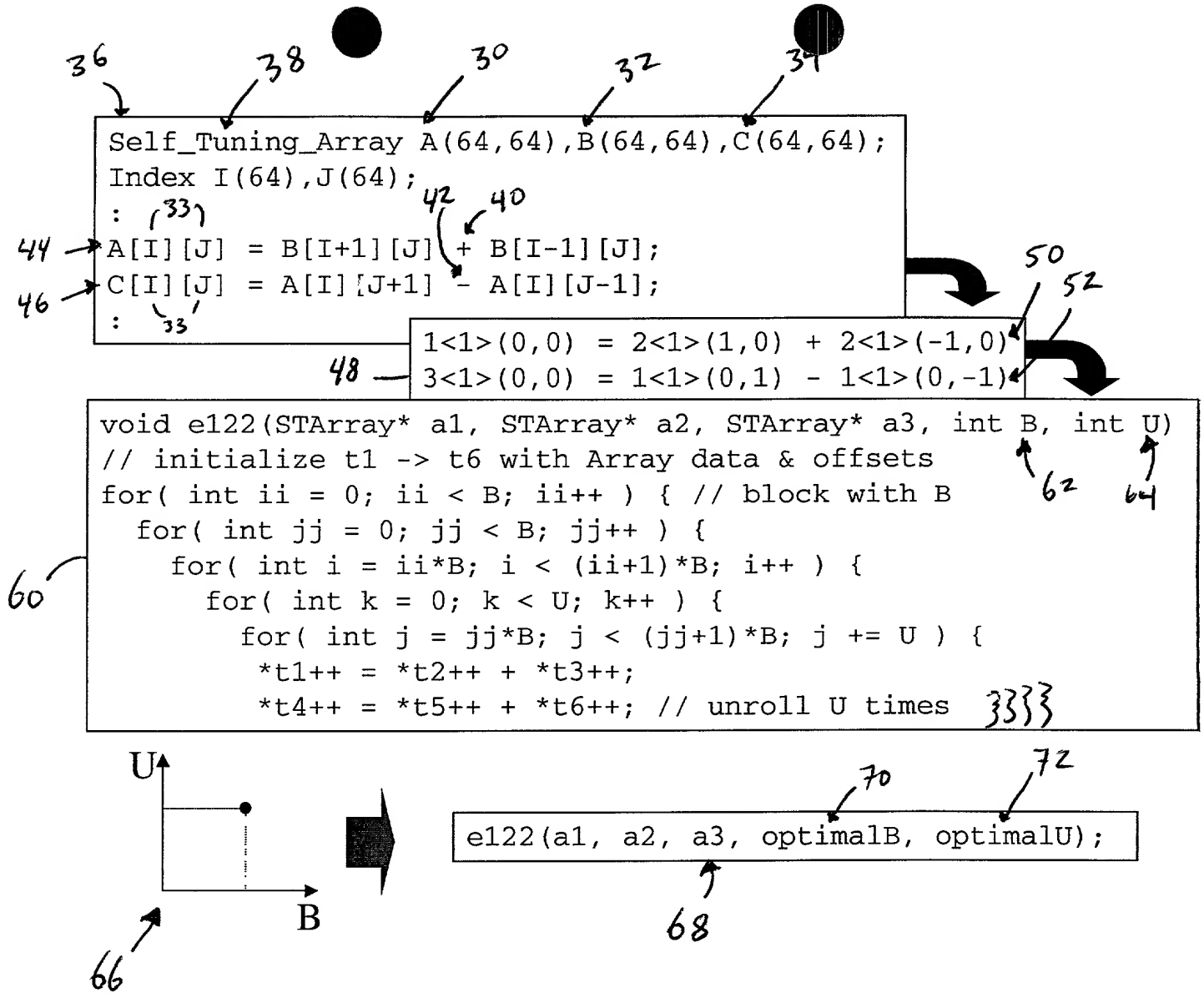
36
38
30
32
34
Self_Tuning_Array A(64,64),B(64,64),C(64,64);
Index I(64),J(64);
:
33
42
40
44
A[I][J] = B[I+1][J] + B[I-1][J];
46
C[I][J] = A[I][J+1] - A[I][J-1];
:
33'
50
52
48
1<1>(0,0) = 2<1>(1,0) + 2<1>(-1,0)
3<1>(0,0) = 1<1>(0,1) - 1<1>(0,-1)
void e122(STArray* a1, STArray* a2, STArray* a3, int B, int U)
// initialize t1 -> t6 with Array data & offsets
62
64
for(int ii = 0; ii < B; ii++) { // block with B
for(int jj = 0; jj < B; jj++) {
60
for(int i = ii*B; i < (ii+1)*B; i++) {
for(int k = 0; k < U; k++) {
for(int j = jj*B; j < (jj+1)*B; j += U) {
*t1++ = *t2++ + *t3++;
*t4++ = *t5++ + *t6++; // unroll U times
3333
U
B
66
70
72
e122(a1, a2, a3, optimalB, optimalU);
68

FIGURE 2

User Code 100

```
:
:
A[I][J] = B[I+1][J] + B[I-1][J];      104
C[I][J] = A[I][J+1] - A[I][J-1];      104
D[I][J] = C[I+1][J] + C[I+1][J];      104
E[I][J] = D[I][J+1] - D[I][J-1];      104
:
:
:
:
A[I][J] = B[I][J] + D[I][J];          109
C[I][J] = B[I][J] - D[I][J];          109
:
:
:
:
A[I][J] = C[I-1][J] + B[I-1][J];      113
B[I][J] = C[I][J+1] - B[I][J+1];      113
:
:
```

Optimized kernels 102

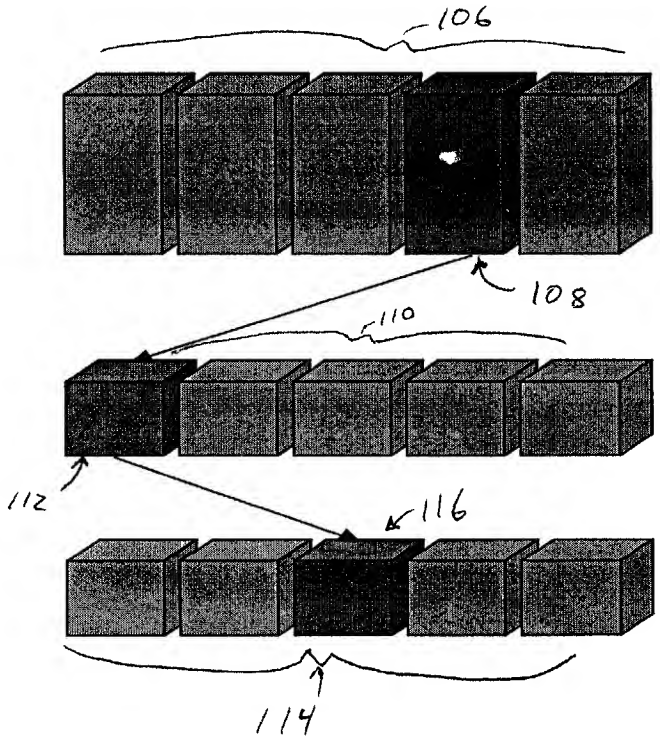

FIGURE 3